

## CLAIMS

1. A clock data recovery circuit comprising:
  - a data identifier that identifies input data based on a clock generated by a voltage control oscillator;
- 5 a frequency divider that divides a frequency of the input data;
  - a phase comparator that detects a phase difference between a phase of the clock generated by the voltage control oscillator and a phase of the input data of which frequency is divided by the frequency divider, and generates a phase difference signal to eliminate the
- 10 detected phase difference; and
  - the voltage control oscillator that generates the clock by adjusting an oscillation frequency based on the phase difference signal, and outputs the clock to both the data identifier and the phase comparator.
- 15
2. The clock data recovery circuit according to claim 1, further comprising:
  - a variable delaying unit that generates a delay clock which is obtained by delaying the clock generated by the voltage control oscillator by a predetermined time, between the voltage control
- 20 oscillator and the phase comparator, wherein
  - the phase comparator detects a phase difference between a phase of the delay clock and a phase of input data of which frequency is divided by the frequency divider, and generates the phase difference signal.
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3. The clock data recovery circuit according to claim 2, wherein  
the predetermined time to be used to delay the clock generated  
by the voltage control oscillator is set at the outside.

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4. The clock data recovery circuit according to claim 2, further  
comprising:

a duty ratio detector that determines a delay time to be used to  
delay the clock generated by the voltage control oscillator based on a  
10 duty ratio of the input data, and outputs the determined delay time to  
the variable delaying unit.

5. The clock data recovery circuit according to claim 1, further  
comprising:

15 a variable delaying unit that generates a delayed  
frequency-divided input data which is obtained by delaying the input  
data of which frequency is divided by the frequency divider by a  
predetermined time, between the frequency divider and the phase  
comparator, wherein

20 the phase comparator detects a phase difference between a  
phase of the clock generated by the voltage control oscillator and a  
phase of the delayed frequency-divided input data, and generates the  
phase difference signal.

25 6. The clock data recovery circuit according to claim 5, wherein

the predetermined time to be used to delay the input data of which frequency is divided by the frequency divider is set at the outside.

5 7. The clock data recovery circuit according to claim 5, further comprising:

a duty ratio detector that determines a delay time to be used to delay the input data of which frequency is divided by the frequency divider based on a duty ratio of the input data, and outputs the  
10 determined delay time to the variable delaying unit.

8. The clock data recovery circuit according to claim 1, further comprising:

a variable delaying unit that generates delayed input data  
15 obtained by delaying the input data by a predetermined time, at a front stage of the data identifier, wherein  
the data identifier identifies the delayed input data based on the clock generated by the voltage control oscillator.

20 9. The clock data recovery circuit according to claim 8, wherein  
the predetermined time to be used to delay the input data is set  
at the outside.

10. The clock data recovery circuit according to claim 8, further  
25 comprising:

a duty ratio detector that determines a delay time to be used to delay the input data based on a duty ratio of the input data, and outputs the determined delay time to the variable delaying unit.

- 5        11.     A clock data recovery circuit comprising:
  - a first clock generating circuit that generates a first clock synchronous with a rise of input data;
  - a second clock generating circuit that generates a second clock synchronous with a fall of the input data;
- 10        a phase combiner that combines the first clock with the second clock, and outputs a clock of an intermediate phase between a phase of the first clock and a phase of the second clock, to a data identifier; and the data identifier that identifies the input data based on the clock of the intermediate phase.
- 15        12.     The clock data recovery circuit according to claim 11, wherein the first clock generating circuit includes
  - a frequency divider that divides a frequency of input data at a rise of the input data;
  - 20        a phase comparator that detects a phase difference between a phase of the first clock and a phase of the input data of which frequency is divided by the frequency divider, and generates a phase difference signal to be used to eliminate the detected phase difference; and
  - 25        a voltage control oscillator that generates the first clock

by adjusting an oscillation frequency based on the phase difference signal, and outputs the first clock to both the phase combiner and the phase comparator, and

the second clock generating circuit includes

- 5           a frequency divider that divides a frequency of the input data at a fall of the input data;

              a phase comparator that detects a phase difference between a phase of the second clock and a phase of the input data of which frequency is divided by the frequency divider, and generates a  
10          phase difference signal to be used to eliminate the detected phase difference; and

              a voltage control oscillator that generates the second clock by adjusting an oscillation frequency based on the phase difference signal, and outputs the second clock to both the phase  
15          combiner and the phase comparator.